THE POWER OF PERSPECTIVE: THE EFFECT OF PERFORMANCE REPORTING FRAMES ON COLLABORATION

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THE POWER OF PERSPECTIVE: THE EFFECT OF PERFORMANCE REPORTING FRAMES ON COLLABORATION

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SUMMARY

While organizations want to encourage collaboration, individual free riding undermines the success of collaborative efforts. In this paper, I investigate whether it is possible to mitigate free riding problems through altering how individual performance is framed when reported. On the one hand, individuals could report their performance using an individualistic frame that only focuses on the individual's net cost of collaboration, which will merely highlight the incentive to free ride. In contrast, individuals could instead report their behavior using alternative frames that emphasize collaborative aspects of their actions. Drawing on research in psychology, I predict that individuals who report under collaborative frames will be more willing to collaborate than those who report under an individualistic frame. Utilizing an anonymous and single-shot public goods game, I demonstrate that contribution amounts are higher with collaborative frames than with an individualistic frame. Results also suggest that the reporting frames alter participants' reasoning focus, which helps to explain their levels of collaboration. Further, a second experiment shows that performance reporting frames impact collaboration even in a repeated setting. My findings have broad implications for organizations that face free riding problems, from individual firms that want to encourage collaborative efforts among their employees to organizations that want to encourage firms to invest more in public goods.

CHAPTER 1. INTRODUCTION

Collaboration is pervasive and important to business success and economic development. Well-developed abilities to create and maintain fruitful collaboration award companies a significant competitive advantage. Examples of collaboration include teamwork within an organization, communities, strategic alliances, and joint ventures. Prior research finds that both formal control (goal setting, incentive systems, monitoring) and informal control (trust, social norms, reputation) affect collaboration (Nicolaou et al., 2011; Chua and Mahama, 2007; Emsley and Kidon, 2007; Anderson and Dekker, 2005; Coletti et al., 2005; Das and Teng, 1998). In this study, I investigate whether performance reporting could be identified as a new potential mechanism to encourage collaboration. Specifically, I argue that individuals who report their performance under certain frames will collaborate more.

Investigating how performance reporting frames improve collaboration is important. Although companies utilize collaboration as a key strategy to achieve competitive advantage, many forms of collaboration are unstable due to free riding problem. With incentives to free ride, it is hard to achieve a desired level of collaboration. While the existence of complete contracts over collaborative actions could eliminate free riding problems, it is prohibitively costly to specify every state of nature in a contract (Kreps, 1990; Townsend, 1979). Therefore, this study suggests that a relatively effortless method to encourage collaboration is for action takers to report on their collaborative performance, even if it is infeasible for a central authority to write optimal *ex ante* contracts around those reported outcomes. For example, member governments commonly report on

their contributions to the United Nations, companies issue reports about both their social responsibility and their strategic partnerships (e.g., with peer firms, suppliers, industry associations, etc.), and managers of subdivisions discuss their collaborative efforts within the larger organization.

To explore whether and how performance reporting frames affect collaboration, I utilize a classic public goods game, which is a popular collaborative setting in the literature. In a classic public goods game, every individual in one group receives a same amount of endowment and decides to invest any to a group account. The payoff to each group member is the equal share of the group account balance which is the total investments multiplied by a multiplier (Chaudhuri, 2011; Ledyard, 1995). By conveying the same information regarding contribution behavior, individuals could communicate their contribution decision through mentioning one of the following four numbers. From the traditional economic perspective, individuals should only care about the net consequence of behavior in decision-making processes. Since individuals lose money when contributing, I specify those individuals who communicate the net cost of collaboration as reporting under an individualistic frame. Alternatively, individuals can report their behavior by concentrating on collaborative aspects (i.e., collaborative frames). Individuals could mention their contribution amounts when reporting to group members, i.e., the collaborative investment frame. Since an amount invested will be multiplied by a multiplier in the group account, individuals may highlight in their reports the impact of their investments on final outcomes in the group account. I define this reporting format as the investment impact frame. Last, because all the members will evenly split the total amounts in the group account,

individuals can announce the share they receive from final outcomes, i.e., the share of collaborative outcomes frame.

My hypothesis about performance reporting frames is first grounded in framing effects (Levin et al., 1998; Levin and Gaeth, 1988). A large body of literature documents how alternative framing of information affects individuals' judgments and decisions. This literature suggests that framing effects occur because information is highlighted relative to its descriptive frame in memory, and this emphasis will influence individuals' decisions. Based on this argument, I further argue that the frame that individuals use to report their contribution highlights the described information in individuals' mind, leads individuals to focus on emphasized information when thinking about why and how much to contribute, and then affects individuals' contribution amounts. To elaborate, the individualistic frame reminds individuals of negative aspects of contributing, exacerbates their propensity to focus on the reasons not to contribute, and, consequently, leads to a lower contribution. In contrast, the collaborative investment frame, the investment impact frame, and the share of collaborative outcomes frame emphasize positive aspects of contributing. Thus, individuals under those three frame are more likely to consider reasons to contribute, resulting in higher contribution accounts.

Contribution behavior not only depends on individuals' own perspective on contributing, but also rely on how individuals perceive their group members' contribution behavior. According to social projection theory, individuals tend to think others will behave similarly to themselves (Krueger, 1998). Furthermore, research on trust suggests that individuals tend to trust their group members when they expect group members to collaborate, and this trust will further boost their own performance (Christ et al., 2012;

Nicolaou et al., 2011; Das and Teng, 1998; Williamson, 1993). Specifically, because collaborative frames highlight positive consequences of contributing, individuals who are more likely to contribute in those frames will expect their group members to collaborate more. This expectation of group members' contributions further increases individuals' trust on group members, which in turn increases individuals' contribution. Conversely, individuals under the individualistic frame tend to contribute less and, thus, do not believe that group members will contribute. As a consequence, individuals are less likely to trust their group members and in turn decrease their contribution.

I examine how performance reporting frames influence individuals' collaboration via a 1×4 between-subject experiment, varying the frames that participants use to report their contribution behavior towards the group members. Consistent with my prediction, the results show that individuals using one of the three collaborative reporting frames contributed higher amounts to the group account than those using the individualistic frame. In addition, planned comparisons indicate that the collaborative investment frame and the investment impact frame trigger directionally higher contributions than the net cost of collaboration frame, and that the share of collaborative outcomes frame leads to significantly larger contributions than the other three frames. To examine participants' reasoning focus, I conduct a mediation analysis and find that reporting frames alter how participants consider the choice to invest in collaboration, and in turn change their willingness to invest. Particularly, individuals are more likely to focus on reasons to contribute if they report their behavior using the collaborative frames, whereas they pay more attention to reasons for not contributing when reporting under the individualistic frame.

I conclude the empirical analyses with a battery of additional tests. First, to offer more evidence on whether free riding issues diminish when individuals use the collaborative frames in reporting behavior, I examine whether the number of individuals who contributed zero to the group account (i.e., complete free riding) is lower in the collaborative frames conditions than in the individualistic frame condition. This is indeed what the data shows. Second, previous research documents that players' mean contribution is 50% of their endowment in a one-shot public goods game (Chaudhuri, 2011; Ledyard, 1995). Using this result as a benchmark, I find that more individuals give more than 50% of their endowment when reporting under the collaborative frames than when reporting under the individualistic frame, thus lending further support to my hypothesis. Third, to explore the key driver in the reasoning focus, I collect data from Amazon Mechanical Turk and show that trusting others mediates the relation between reporting frames and contribution amounts.

Since group members often interact with each other for a long time in the real world, I run a supplemental experiment to test whether performance reporting frames could alter individuals' collaborative behavior even in a repeated setting. The results from a repeated public goods game provide evidence that performance reporting frame could still influence collaboration in a setting with reputation. Specifically, in the first round, I replicate that individuals are more likely to contribute under the three collaborative frames than under the individualistic frame. Then in subsequent rounds, I find that the effects of reporting frames persist until the penultimate round, supporting the effects of reporting frames even in a setting with reputation.

My study first contributes to the literature on the mechanisms to overcome free riding. Two lines of studies are most closely related to my work. First, numerous studies in behavioral economics provide evidence that information about others' actions affects contributions in public goods games (Chaudhuri, 2011; Ledyard, 1995). However, one authority should be present in the game to provide that information to players, limiting the generalization of this method. Second, extant studies suggest that frames of a public goods game have the potential to mitigate free riding problems (Böhm and Theelen, 2016). However, frames of information are rarely noticed (Nikiforakis, 2010). I add to the literature by showing performance reporting frames as an alternative tool to encourage collaboration without demanding an authority and without changing frames of the game.

Second, the insights from testing performance reporting frames shed light on the real effects of disclosure (Kanodia and Sapra, 2016). Prior studies on real effects of disclosure have examined whether disclosure affects product quality (Jin and Leslie, 2003) and workplace safety (Christensen et al., 2017). Studies have also pointed out that disclosure could change firms' risk management (Zhang, 2009), internal capital allocation (Cho, 2015), and corporate investment (Shroff, 2017). My study extends this important line of inquiry by showing that disclosure also affects free riding in collaborative settings, such as team production and debt negotiation (Teoh, 1997).

Third, my results have direct implications on recent corporate social responsibility (CSR) literature and practice. Recently, burgeoning developments in CSR disclosure guidance have led to variations in CSR practice. When reporting CSR activities, companies typically use frames that can be categorized into the four groups in this paper. While regulators have a strong desire to standardize CSR disclosure guidance, literature on the

implications of existing disclosure practices are limited to boost the standardization process (Martin and Moser, 2016; Moser and Martin, 2012). Martin and Moser (2016) find that investors respond favorably to CSR reports with social impact information. In addition, they find that, by anticipating investors' preference, managers tend to highlight social impact when disclosing CSR activities rather than net cost to companies. My paper adds to this research stream by showing that the framing effects can influence managers' willingness to engage in CSR activities. The finding should be of interest to regulators, preparers, and readers who seek to formalize or understand CSR reports.

The rest of this paper is organized as follows. Chapter 2 reviews the literature; In Chapter 3, I develop my theoretical prediction; Chapter 4 describes the experimental design; Chapter 5 reports the main results and additional analyses; Chapter 6 introduces a second experiment; and Chapter 7 offers concluding comments.

CHAPTER 2. BACKGROUND AND LITERATURE REVIEW

2.1 Collaboration

Over the past several decades, managers have given considerable attention to the importance of building a collaborative enterprise (Prusak, 2011; Coletti et al., 2005). An increasing number of managers realize that maintaining a collaborative environment in a firm has become a key corporate asset. In a survey of training workers, over ninety percent of respondents indicate that they work with other people as a team in daily work (Allerton, 1996). Similarly, over eighty percent of senior executives in a survey conducted by Ernst and Young (2013) indicate that team effectiveness is critical for their organizations to maintain a competitive advantage. Moreover, based on the data collected by Cross et al. (2016), managers and employees spend 50% more time on collaborative activities than they did in the past two decades. In addition, organizations become increasingly engaged in inter-organizational collaborations, such as strategic alliances, joint ventures (Nicolaou et al., 2011). Accordingly, collaboration is taking over the workplace.

While collaboration provides a variety of advantages to business success, maintaining a collaborative environment in any group is hard due to free riding problems. Individuals are willing to collaborate because they believe they can gain more from collaborating. However, without information about others' behavior in the group, individuals have incentives to free ride because they could benefit from others' collaborative output without any personal input. When everyone in a group has incentives to free ride, no one is willing to collaborate and collaboration fails.

Management accounting plays a critical role in improving collaboration through designing and implementing management controls. To induce favorable behavior from employees in pursuit of organizational goals, management teams design a variety of control mechanisms to constrain the decision making of employees (Birnberg and Snodgrass, 1988). Those controls are often formal mechanisms, such as segregating duties, implementing policies, providing performance-based compensation, using supervisor reviews, and so on (Christ et al., 2012). For example, Ittner et al. (1999) find that supplier partnerships benefit from an increased monitoring practice. Coletti et al. (2005) reveal that monitoring mechanisms enhance perceived trustworthiness among collaborators and then increase collaboration. In the context of a public goods game, Sefton et al. (2007) and Fehr and Gächter (2000) suggest that monetary punishments and rewards can overcome free riding and encourage collaborative behavior. In addition, Maas and van Rinsum (2013) find that individuals tend to overstate their performance more if their reports increase others payoff than if those reports decrease others' payoff. In summary, evidence suggests that management teams can design formal control systems to help realize specific organizational goals.

While formal controls can be useful in mitigating free riding problems, they can also be costly or infeasible for management to enforce in settings where it is hard to measure employee inputs. As an alternative, informal controls implement social pressure to employees by communicating organizations' value statements with no explicit mechanisms to enforce (Berry et al., 2009). Typical informal controls could be social norms, trust, and group identifications (Rowe, 2004; Towry, 2003; Kachelmeier et al., 2014). In a laboratory experiment, Rowe (2004) provides evidence that successfully

inducing a group frame will motivate collaboration among individuals. Kachelmeier et al. (2014) argue that communicating values to employees will induce them to focus more on quality than quantity. In this spirit, I next consider the role of informational nudges.

2.2 Informational Nudges

My study is most closely related to literature on informational nudges. Informational nudges, a style of information provision intended to alter societal behavior, serves as a popular nonpecuniary measure in encouraging collaborative behavior and diminishing free riding behavior (Bao and Ho, 2015). For example, lab and field experiments have shown that providing information about others behavior can influence individual behavior in a public goods game (Sell and Wilson, 1991; Croson, 2001; Croson and Shang, 2008; Kreitmair, 2015).

More specifically, Sell and Wilson (1991) find that, in a public goods game, individuals' contribution amounts are higher when they have information about how other group members have contributed than when they don't have this information. This information effect is even stronger when the information is available every round (Cason and Khan, 1999; Gächter et al., 1996). In a field experiment of public radio fundraising, Shang and Croson (2009) find that the most influential level of contribution information is selected from the contribution at the 90th to 95th percentile of all prior contributions. In addition, in two large field experiments, Ayres et al. (2013) find that feedback on peer comparisons reduces energy consumption, such as home electricity and natural gas usage, at a low cost. Combined, this literature points out that descriptive norms serve as effective means in encouraging collaborative behavior (Bao and Ho, 2015; Cialdini et al., 1990).

While informational nudges have become gradually prominent in the literature, they rely significantly on third parties to provide information to decision-makers regarding relative behavior information. However, information could also be available without third parties if individuals are required to self-report their behavior. Therefore, one underexplored area is how decision makers' disclosure of behavioral information affects their own collaborative behavior. Individuals' anticipation of submitting reports about their actions could potentially affect their *ex ante* willingness to collaborate. In the next section, I consider framing effects to better understand how reports might be used as informational nudges in a public goods game.

2.3 Framing Effects

Over the past few decades, studies on framing effects have proliferated in the area of behavioral economics and business. Principal of extensionality suggests that individuals should behave similarly when information and incentive contracts are identical (Kahneman and Tversky, 2000; Arrow, 1982). As a violation of extensionality, framing effects occur when divergent descriptions of the same information encourage different decisions.

A number of studies in behavioral economics have documented the existence of framing effects in responses to social dilemma. More specifically, studies in behavioral economics explicitly place their emphasis on how framing effects could be utilized to mitigate free riding problems. For instance, Nikiforakis (2010) examines earnings feedback and contribution feedback under threat of peer punishment in a public goods game, implying that earnings feedback has a negative effect on contribution whereas contribution feedback has a positive effect on contribution. Ellingsen et al., (2012) reveal that just

labeling a social dilemma game as a "stock market game" makes the collaboration more likely than labeling that as a "community game". In a repeated public goods game experiment and an applied vignette experiment, Böhm and Theelen (2016) provide evidence that both outcome valence framing and externality valence framing of the task influence people's willingness to engage in collaborative behavior.

Similarly, framing effects have also attracted attentions from accounting researchers. The most popular framing in accounting research is the framing of incentive contracts, comparing positively framed bonus contracts with negatively framed penalty contracts. For example, Luft (1994) asserts that people tend to choose a bonus contract over a penalty contract. Hannan et al. (2005) extend this stream of research by arguing that penalty contracts could trigger higher agent effort than bonus contracts. Nevertheless, in an incomplete contract setting, Christ et al. (2012) provide evidence that penalty contracts lead to lower effort than bonus contracts. Adding to this stream of literature, I identify four different *reporting* frames and examine the role of those frames in encouraging collaboration. In a mandatory reporting setting, I expect that individuals' willingness to collaborate will change based on the frame they use to report their behavior. I present a study in which I manipulate the reporting frames in a public goods game and show how anticipation of sending a report under diverse frames sways individual collaborative behavior. The four different reporting frames are further explained as follows.

In a standard public goods game, individuals in the same group are privately endowed with the same amount of money and decide whether they want to collaborate. The money individuals allocate to the group account will be multiplied by a parameter and the final amount in the group account will be evenly shared by all group members

(Chaudhuri, 2011; Ledyard, 1995). Consistent with traditional economic perspectives, individuals should only care about their net cost of collaboration when deciding the amount to give to the group account. Therefore, the reporting frame regarding the net cost of collaboration is defined as an individualistic frame. Alternatively, individuals can focus on other collaborative aspects of their behavior in reporting (i.e., collaborative frames). One obvious way to talk about an individual's own behavior in this game is to just report the contribution amount (i.e., collaborative investment frame). In addition, an individual could inform group members about the total increased amount in the group account due to the contribution decision (i.e., investment impact frame). Furthermore, since all group members will evenly split the final amount in the group account, individuals can announce the amount they receive based on their own contribution (i.e., share of collaborative outcomes frame). Taken together, four alternative frames are available to report individuals' own contribution behavior.

CHAPTER 3. THEORY AND HYPOTHESES

To compare contribution amounts in those four frames, I refer to framing effects. Levin et al. (1998) first demonstrate that there are three different types of framing effects, including risk choice framing, attribute framing, and goal framing. Those frames affect decisions with different underlying mechanisms and consequences. Risk choice framing, the standard view of framing, is manipulated through the presentation of a choice in two prospects. One is a sure thing prospect and the other is a two-outcome chances prospect. Attribute framing refers to a scenario that a single attribute of an object is the manipulated frame and evaluation of that object is the measured variable. Different from risk choice framing and attribute framing, goal framing is designed to impact individuals' implicit goals and find a more powerful goal enhancer. The evaluated situation may be framed as whether the subject provides benefits or whether the subject prevents losses. Since my reporting frames focus on only one aspect of the collaborative behavior in one report, my setting is closely related to attribute framing.

Attribute framing works because information is emphasized in individuals' mind based on its descriptive frame. Specifically, positive framing emphasizes positive information and stimulates positive associations with the evaluated object; whereas negative framing highlights negative information and stimulates negative associations. Russo et al. (1996) demonstrate that the mere presence of positive associations with one object will positively distort individuals' evaluation of that object. However, negative associations of an object in memory could result in negative distortions in individual judgments. Hence, attribute framing influences information presentation in associative

memory, and this presentation difference is the cause of valance-consistent evaluation. Based on this argument, I propose that the frame individuals use to report their behavior will highlight the described information in their memory, shift individuals' reasoning focus to those highlighted information associations, and then alter individuals' decisions to be consistent with the frame valence.

In a collaborative setting, individuals' decision not only relies on how they consider collaboration, but also relates to how they think about other collaborators' behavior. Individuals are less likely to collaborate if they believe that other collaborators are more willing to free ride. Therefore, it is critical to understand how others will behave in the collaborative game. Social projection theory suggests that individuals have the tendency to believe that others will behave similarly to themselves (Krueger, 1998). In addition, recent research documents that individuals will trust their group members if they believe their group members are willing to collaborate, which in turn will increase individuals' performance (Christ et al., 2012; Nicolaou et al., 2011; Das and Teng, 1998; Williamson, 1993).

Based on the above arguments and framing effects, I argue that individuals under the collaborative frames pay attention to the positive associations of collaboration and then are more likely to contribute. At the same time, individuals trust their group members because they believe that other group members will behave similarly to them, which further enhance their propensity to collaborate. In contrast, the individualistic frame highlights the negative aspects of collaborating and then leads individuals to focus on thinking about negative aspects of contributing. Therefore, individuals are less likely to contribute. In addition, individuals under the individualistic frame will not trust their group members

since they think their group members have similar behavior to themselves. This mistrust further decrease individuals' own contribution. Therefore, compared with the net cost of collaboration frame, the three collaborative frames could trigger higher contribution amounts from individuals. My hypothesis is formalized as follows:

> **Hypothesis:** *Contributions to a public goods game are higher when the collaborative reporting frames are used than when the individualistic frame is used.*

Due to the lack of robust theories, I make no prediction about the comparison in terms of contribution amounts among the three collaborative frames.

CHAPTER 4. EXPERIMENT 1

4.1 Experimental Task

My experiment uses a one-shot public goods game, which is programmed and conducted with the software z-Tree (Fischbacher, 2007). Participants are randomly assigned to groups of three, and each participant is endowed with $10 that could be contributed to a group account. Each dollar they contributed is multiplied by 1.5, resulting in $1.5 in the group account. The three group members will evenly split the total amount in that account after every member contributes. In other words, each participant could get $0.5 back per dollar allocated to the group account and the net cost of the contribution is $0.5 per dollar. After making contribution decisions, participants are required to submit a report about their contribution behavior to all group members based on the frame manipulation (see Appendix A, B, and C). They then see the three reports from all members and check their own payoffs.

4.2 Experimental Design

The 1 × 4 between-subject design incorporates the frames that participants use to report their behavior to all group members. For instance, as shown in Appendix C, the four distinct frames of these reports are operationalized as follows if a participant contributes $5:

1) The net cost of collaboration frame, in which the participant reports her net cost, $2.5, after contributing;

2) The collaborative investment frame, in which the participant reports her contribution amount, $5;

3) The investment impact frame, in which the participant is guided to report how the group benefits from her contribution as a whole, $7.5;

4) The share of collaborative outcomes frame, in which the participant announces the amount she gets back from her contribution, $2.5.

My primary dependent variable is contribution amounts participants allocate to the group account.

4.3 Experimental Procedures

Upon arrival, each participant was assigned a number and provided with written instructions and details about her compensation contract. To ensure that they were comfortable with the game, participants were asked to complete a short quiz and the experiment did not begin until they answered all the questions correctly. Before the actual game started, participants were guided to play a practice round to get familiar with the public goods game and to ensure that they understood the decision task. In this practice round, each subject acted as all three members of a group (one at a time) and was not paid. Participants then began the actual round and were informed that their decisions in this round determined their payoff. In this round, participants were first asked to make contribution decisions (see Appendix B) and submit a report depending on their condition. To take a close look at how they form their contribution decisions, before seeing the reports from all group members, participants were required to write down the reasons why they

contributed the amount that they did. Upon completion of the actual round, participants completed a post-experimental questionnaire.

Participants received a show-up fee of $5. Additional compensation is based on group members' contribution decisions. More specifically, the payoff function for each participant is the endowment plus a personal share of the final amount in the group account minus their own contribution. That is, there were no incentives for the participants to contribute any amounts to the group account. Hence, economic equilibrium analysis assuming self-interested behavior implies $0 would be allocated to the group account. In my experiment, participants' payoff ranged from a low of $10 to a high of $25, with an average payoff of $17.64.

4.4 Participants

I recruited student volunteers from the undergraduate population at a large US public university. A total of 96 students participated in one of eight 30-minute sessions, with 9 to 15 participants per session. These students were randomly assigned to one of the four experimental conditions, with 24 in each condition. On average, participants are 20 years old and 47 percent of them are female.

CHAPTER 5. RESULTS OF EXPERIMENT 1

5.1 Descriptive Statistics

Table 1, Panel A reports descriptive statistics by experimental cells related to my main dependent variable, contribution amounts. Corroborating previous public goods game experiments, all conditions show non-zero contributions, with a grand average of $5.27. Moreover, cell means suggest that participants' contributions in the net cost of collaboration frame condition are directionally lower than those in the collaborative investment frame condition, the investment impact frame condition, or the share of collaborative outcomes frame condition. This pattern of results is consistent with my prediction.

Table 1: Contribution Amounts

Panel A: Descriptive Statistics

Experimental Condition

Individualistic Frame	**Collaborative Frames**		
Net Cost of Collaboration	Collaborative Investment	Investment Impact	Share of Collaborative Outcomes
3.91 (4.02) n=24	4.70 (4.03) n=24	5.33 (4.09) n=24	7.13 (2.03) n=24

Panel B: One-way ANOVA

Source	*Sums of Squares*	*df*	*Mean Square*	*F-Stat*	*p-Value*
Intercept	2667.04	1	2667.04	184.38	< 0.001
Reporting Frames	134.21	3	44.74	3.09	0.031

Panel C: Planned Contrast

Source	*Sums of Squares*	*df*	*Mean Square*	*F-Stat*	*p-Value*
-3, +1, +1, +1	58.68	1	58.68	4.06	0.047
Residual	78.52	2	39.26	2.61	0.08

Panel D: Planned Comparisons

Comparison	*Difference*	*df*	*t-Stat*	*p-Value*
Share>Net Cost	3.22	46	3.16	0.0028
Investment Impact>Net Cost	1.42	46	1.21	0.20
Collaborative investment>Net Cost	0.79	46	0.68	0.49

This table presents the descriptive statistics and results of hypothesis tests of participants' contributions amounts. In this experiment, participants are asked to contribute money to a group account in a public goods game. Depending on their condition, they then are asked to report their contributions behavior to group members in one of the subsequent frames: the net cost of collaboration, the collaborative investment, the investment impact, or the share of collaborative outcomes. The primary dependent variable is participants' contribution amounts.

Panel A presents the descriptive statistics for participants' contribution amounts.

Panel B presents the one-way ANOVA test that evaluates whether the participants' contribution amounts differ across the four conditions.

Panel C presents the planned contrast test whether the participants' contribution amounts in the collaborative investment frame condition, the investment impact frame condition, and the share of collaborative outcomes frame condition are higher than those in the net cost of collaboration frame condition. I perform this comparison by using contrast coefficients of -3 for the net cost of collaboration frame condition, +1 for the collaborative

investment frame condition, +1 for the investment impact frame condition, and +1 for the share of collaborative outcomes frame condition.
Panel D presents the results of planned comparisons between the alternatives frames in the collaborative frame and the individualistic frame.
All *p*-Value are two-tailed.

5.2 Tests of Hypothesis

My hypothesis considers the effect of reporting frames, suggesting that three collaborative frames could trigger higher contribution amounts than an individualistic frame. For this purpose, I first report a one-way ANOVA that examines the 1×4 model, using contribution amounts as the dependent variable. My test results, presented in Table 1, Panel B, show that there are statistically significant differences in contributions to the group account between the four different reporting frames (p=0.031, two-tailed), which falls into the pattern predicted by the hypothesis.

I then use planned contrasts to formally test my prediction because I expect that three collaborative frames have higher contributions than the individualistic frame (Guggenmos et al., 2016; Buckless and Ravenscroft, 1990). More specifically, I use contrast coefficients of -3 for the net cost of collaboration frame condition, +1 for the collaborative investment frame condition, +1 for the investment impact frame condition, and +1 for the share of collaborative outcomes frame condition. The contrast determines whether the mean contribution of the three collaborative reporting frames is higher than the mean contribution of the individualistic frame. As reported in Table 1, Panel C, my hypothesis is supported (p=0.047, two-tailed). This result suggests that individuals who expect to report their behavior under collaborative reporting frames tend to allocate more money to the group account than those under the traditional economic frame.

Finally, I report tests of planned comparisons to provide further insights about the role of reporting frames in boosting collaborative actions. In particular, I compare the mean contribution in each of the three collaborative frame conditions with that in the net cost of collaboration frame condition. Table 1, Panel D indicates that the share of collaborative outcomes frame induces higher contribution amounts than the net cost of collaboration frame condition (p=0.0028, two-tailed). However, individuals in the investment impact frame condition and the collaborative investment frame condition have directionally higher contribution amounts than those in the net cost of collaboration frame condition, albeit that the differences are not statistically significant (p=0.20 and p=0.49, respectively, two-tailed). Overall, this pattern of results is consistent with my hypothesis.

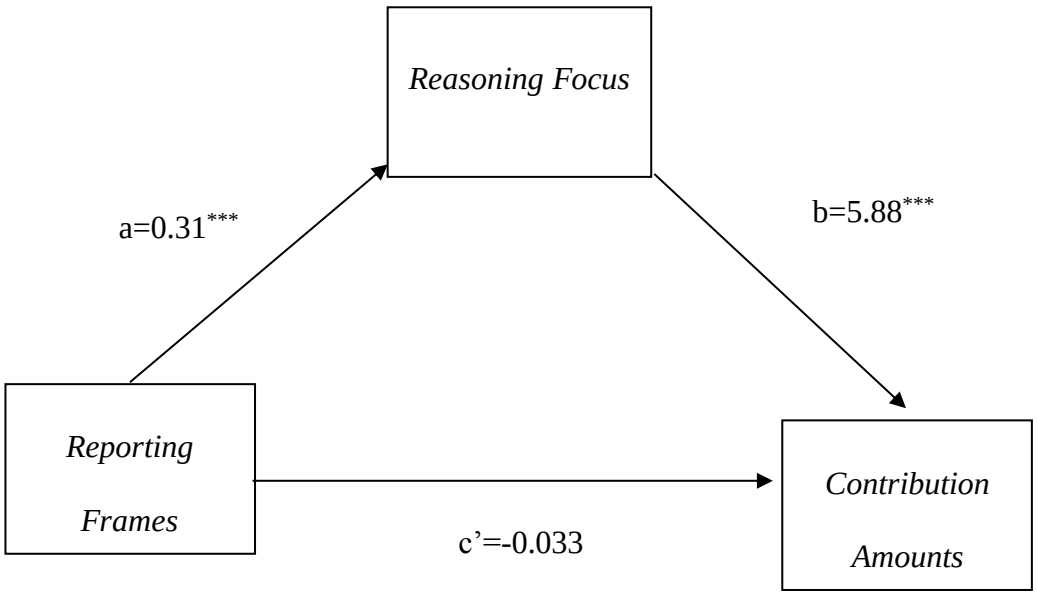
5.3 Mediation Analysis

As noted in the experimental procedures, participants in all conditions were guided to offer their reasoning as to why they contributed the amount that they did. My theory suggests that individuals are induced to update their reasoning focus differentially when they consider whether to contribute. More specifically, I expect to see that individuals with one of the collaborative frames will mainly think about "why" to contribute, whereas those under an individualistic frame will focus on reasons not to contribute.

To examine differences in participants' reasoning focus, two Ph.D. students independently coded the reasons which were written by participants, evaluating to what extent all the listed reasons oppose or support contributing to the group account on a 6-point Likert scale. These Ph.D. students were either blind to my manipulation or not informed as to the purpose of my study while conducting their coding. Initial inter-rater

reliability on the coding of participants' responses was 71 percent, suggesting a high initial agreement (Stokes et al. 1995). Those two coders met to reconcile any inconsistencies and the reconciled data were used in the subsequent analysis. Based on the reconciled data, I create a *reasoning focus* and code it as 1 if the reasons support contributing and 0 if the reasons oppose contributing. As depicted in Figure 1, the indirect effect is significant (z=2.72, p=0.006, two-tailed) and the direct effect is insignificant (z= -0.05, p=0.96, two-tailed).[1] Therefore, this mediation analysis provides further evidence for my theory that reporting frames alter individuals' reasoning focus and then affect individuals' willingness to contribute.

Figure 1: Mediation Analysis: Part I



[1] Following Hayes (2013), I use 5,000 bootstrap samples to test whether reporting frames impact contribution amounts through reasoning focus. I also run the mediation analysis by using the 6-point reasoning coding, and the results are similar (indirect effect, p = 0.076; direct effect, p = 0.34; two-tailed).

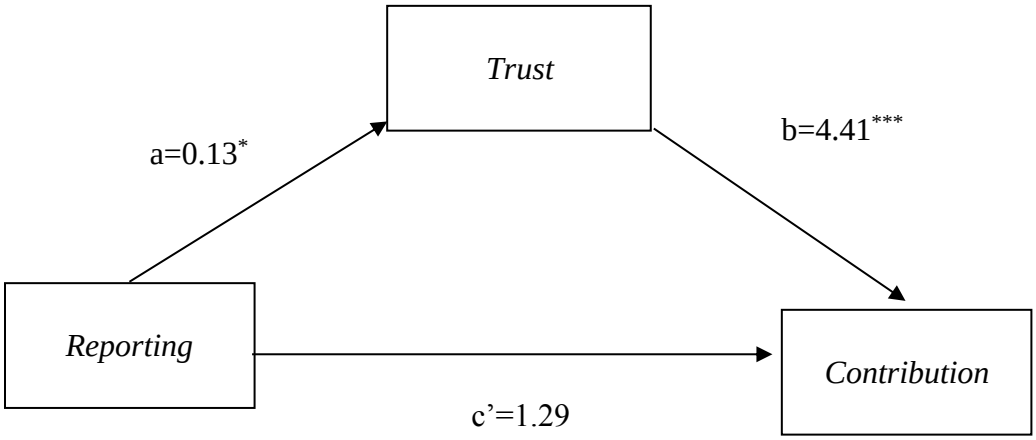
This figure depicts regression coefficients from a mediation analysis. In the experiment, participants are asked to write down "the reasons why you contributed the amounts that you did". Two independent coders are guided to code the reasons as supporting or opposing contributing to the group account on a 6-point Likert scale. Reasoning focus is coded as 1 if the reasons support contributing and as 0 if the reasons oppose contributing.
***, **, * indicate statistically significant at the 0.01, 0.05, and 0.10 levels, respectively, in a two-tailed test.

To take a close look at how reporting frames affect individuals' reasoning focus, I collected additional data by employing 100 workers from Amazon Mechanical Turk (AMT) to code the reasons obtained in my experiment. As I propose in the hypothesis development section, when considering others' actions, individuals are more willing to contribute if they *trust* their group members. Also, previous literature suggests that free riding issues could be reduced if individuals are willing to *take risks* to be the only contributor in the game (Baggio et al., 2015; Schill et al., 2015). What is more, regardless of others' actions, individuals give their endowment to public goods maybe because of *generosity* (Wang et al., 2011). Workers from AMT were guided to evaluate each reason along these three dimensions: 1) *generosity*, 2) *trust*, and 3) *risk taking*. For each dimension, workers were asked to choose one of the following answers: 1) "Yes", 2) "No", or 3) "Not Related".

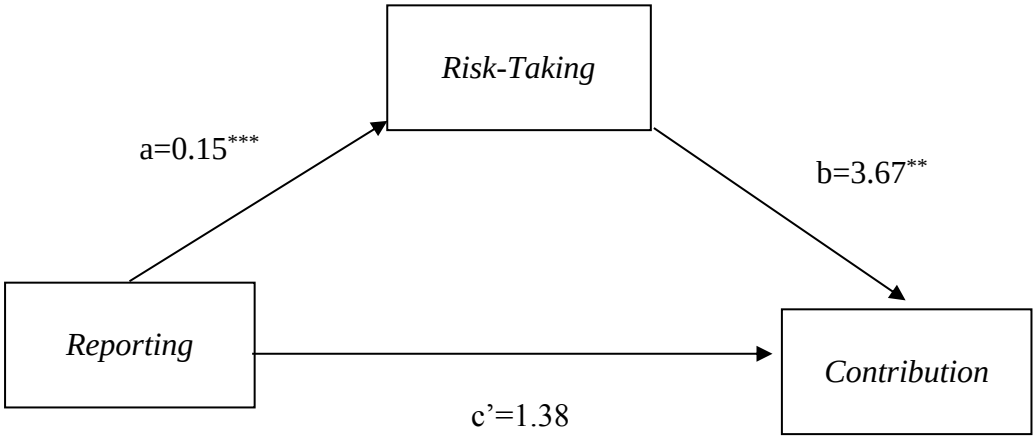
To measure individuals' willingness to *trust*, *take risks*, and *be generous*, I calculate a rate for each dimension of one individual by using the frequency difference between "Yes" answer and "No" answer divided by the total number of coding for one individual. I then create *trust*, *risk-taking*, and *generosity*, assigning 1 if the rate of that dimension is not less than 50% and 0 if the rate of that dimension is not higher than -50%. Figure 2 presents the mediation analysis results of those three dimensions.

Figure 2: Mediation Analysis: Part II

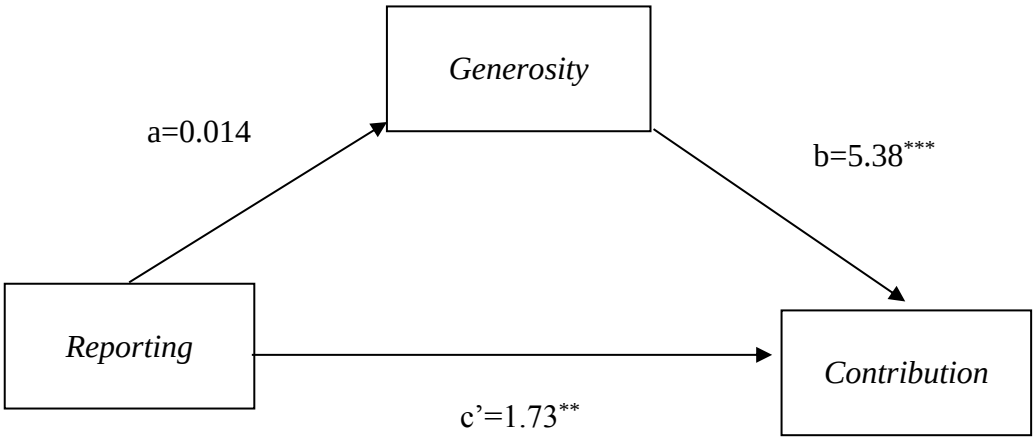
Panel A: Trust



Panel B: Risk-Taking



Panel C: Generosity



This figure depicts regression coefficients from three mediation analyses by using the coding collected on Amazon Mechanical Turk.

Panel A shows the results of a mediation analysis of trust. Workers were guided to evaluate whether one reason expresses "I am willing to trust others." They chose one of the following answers: "Yes", "No", "Not Related". Trust is coded as 1 if the Equation (1) is higher than or equal to 50% and as 0 if the Equation (1) is lower than or equal to -50%.

$$\frac{\text{The number of "Yes"} - \text{The number of "No"}}{\text{The total number of coding}} \quad (1)$$

Panel B shows the results of a mediation analysis of risk-taking. Workers were guided to evaluate whether one reason expresses "I am willing to take risks." They chose one of the following answers: "Yes", "No", "Not Related". Risk-taking is coded as 1 if the Equation (1) is higher than or equal to 50% and coded as 0 if the Equation (1) is lower than or equal to -50%.

Panel C shows the results of a mediation analysis of generosity. Workers were guided to evaluate whether one reason expresses "I am willing to be generous." They chose one of the following answers: "Yes", "No", "Not Related". Generosity is coded as 1 if the Equation (1) is higher than or equal to 50% and coded as 0 if the Equation (1) is lower than or equal to -50%.

***, **, * indicate statistically significant at the 0.01, 0.05, and 0.10 levels, respectively, in a two-tailed test.

The significant relationship between the three mediators and contribution amounts indicates that individuals' willingness to *trust*, *take risks*, and *be generous* leads to higher contributions ($p<0.01$, $p=0.043$, $p<0.01$, respectively, two-tailed). While reporting frames do not affect *generosity* ($p=0.823$, two-tailed), they do significantly influence *trust* and *risk-taking* ($p=0.098$, $p<0.01$, two-tailed). Therefore, not all dimensions mediate the relationship between reporting frames and contributions. Following the bootstrapping method in Hayes (2013), I find no evidence on mediation effects of *generosity* ($p=0.82$, two-tailed) and limited evidence on mediation effects of *risk-taking* ($p=0.09$, one-tailed)[2]. *Trust* is the only variable that mediates the effect of reporting frames on contribution

[2] It is because the effects of both risk-taking and reporting frames on contribution amounts are no longer significant when they are in the same model.

amounts (p=0.066, one-tailed). Collectively, reporting frames influence individuals' tendency to collaborate through their willingness to *trust* others.

5.4 Supplemental Analyses

To provide further support for my hypothesis, I examine the frequency of individuals who contributed zero to the group account (i.e., complete free riding). Table 2, Panel A presents the descriptive statistics for the number of complete free riding. A untabulated logistic regression result indicates that the frequency of complete free riding in the net cost of collaboration frame condition is not significantly higher than that in the collaborative conditions (p=0.25, two-tailed). The frequency of complete free riding in the share of collaborative outcomes frame condition is significantly lower than that in the net cost of collaboration frame condition (p=0.044, two-tailed). Altogether, this direction in the frequency of complete free riding is consistent with the main results.

Prior literature suggests that participants, on average, contribute 50% of their endowment to the public goods in a one-shot public goods game (Chaudhuri, 2011; Ledyard, 1995). Accordingly, I use $5 (50% of the $10 endowment) as a benchmark to distinguish whether individuals engage in moderate free riding. I anticipate that collaborative reporting frames could decrease the frequency of moderate free riding. As reported in Panel B of Table 2, descriptive statistics show that the number of moderate free riding differs across the four conditions. A logistic regression result in Panel C of Table 2 indicates that the frequency of moderate free riding is significantly lower under the three collaborative frames conditions than that under the individualistic frame condition (p=0.027, two-tailed). This result provides supplementary support for my hypothesis.

Table 2: Free Riding

Panel A: Frequency of Complete Free Riding (Contributions=0)

Experimental Condition			
Individualistic Frame	**Collaborative Frames**		
Net Cost of Collaboration	Collaborative Investment	Investment Impact	Share of Collaborative Outcomes
7 n=24	7 n=24	5 n=24	1 n=24

Panel B: Frequency of Moderate Free Riding (Contributions<5)

Experimental Condition			
Individualistic Frame	**Collaborative Frames**		
Net Cost of Collaboration	Collaborative Investment	Investment Impact	Share of Collaborative Outcomes
15 n=24	12 n=24	11 n=24	3 n=24

Panel C: Logistic Regression of Moderate Free Riding (Contributions<5)

Independent Variable	**Expected Sign**	**Parameter Estimate**
Intercept	?	0.51
Reporting Frames	-	-1.08**
Odds Ratio Estimates (Reporting Frames)		2.95
No. of Observations		96

This table presents additional analyses on free riding. My theory suggests that reporting frames could be used to diminish free riding problems. Therefore, I test whether reporting frames influence the number of individuals who engage in free riding.
Panel A presents the frequency of complete free riding in each condition. The frequency of complete free riding is defined as the number of individuals contributing $0 to the group account.
Panel B presents the frequency of moderate free riding in each condition. The frequency of moderate free riding is measured by the number of individuals contributing less than $5 to the group account.
Panel C presents the logistic regression results of moderate free riding. Moderate free riding is coded as 1 if participants contribute less than $5 and as 0 otherwise. Reporting frames are coded as 0 if the individualistic frame is used and as 1 otherwise.
***, **, * indicate statistically significant at the 0.01, 0.05, and 0.10 levels, respectively, in a two-tailed test.

CHAPTER 6. EXPERIMENT 2

6.1 Background

Results from the first experiment suggest that performance reporting frames do alter individuals' collaborative behavior in a way that would promote their collaboration under a more collaborative reporting frame. From an accounting perspective, the finding provides a new mechanism to boost collaboration in any group settings. And to examine the underlying mechanisms of how performance reporting frames impact contributions in the first experiment, individuals play a one-shot public goods game. However, in real-world settings, individuals usually interact with their group members for multiple periods.

Empirical evidence on whether individuals who interact with the same group members for multiple rounds (hereafter, "partners") behave differently from those who play once with their group members (hereafter, "strangers") is far from conclusive (Weimann, 1994; Chaudhuri, 2011). By using a partner-stranger setting, Andreoni (1988) provides experimental evidence that strangers contribute more money to the public good than partners. Weimann (1994) replicates the partner-stranger setting from Andreoni (1988). Surprising, the paper finds that contributions from partners are similar to those from strangers in most rounds. Even in rounds with significantly different contributions between partners and strangers, partners make higher contributions than the contributions of strangers. In a punishment setting, Masclet et al. (2003) point out that non-monetary punishments are more efficient in increasing partners' contributions than strangers'. Collectively, partners may have different behavior from strangers.

While results from a one-shot game in the first experiment demonstrate that performance reporting frames alter strangers' collaboration, it remains an open question whether reporting frames change partners' behavior in repeated settings. Therefore, by designing a repeated public goods game in a second experiment, I examine whether individuals' collaborative behavior differs when they can interact with their group members for multiple rounds.

6.2 Experimental Design and Procedures

In Experiment 2, I employ the same 1 × 4 between-subject design. Independent variables and the dependent variable remain the same as in the first experiment. The experimental procedures and the setting are also identical to the first experiment, except for three changes. First, I increase the number of rounds in this game to at least 7 but no more than 10, with each possible number (i.e., 7, 8, 9, or 10) being equally likely. At the end of each round, individuals can still see performance reports from all group members and then their own payoff in this round. Second, individuals were randomly assigned to groups of three at the beginning of the experiment group. And group composition remains constant for the whole game. Third, individuals were not asked to write down their reasons why they contribute the amount they do in each round.

6.3 Participants

A total of 96 students were recruited from the same large U.S. public university as in Experiment 1. Those students participated in eight 30-minute sessions and formed 32 unique groups. Participants on average are 21 years old and 58 percent are female. They earned an average of $18.6, including a $5 show-up fee.

6.4 Results

Descriptive statistics for the four experimental conditions are presented in Table 3. The primary dependent variable is participants' contribution amounts to their group account in every round. These contribution amounts are also depicted in Figure 3[3]. The main purpose of this second experiment is to test whether and how the four reporting frames impact individual collaborative behavior in repeated interactions among group members. Therefore, I first investigate whether the results in the first round replicate the results in the first experiment, and then consider the long-term effects of reporting frames.

Table 3: Experiment 2

Panel A: Descriptive Statistics

Round	***Experimental Condition***			
	Individualistic Frame	**Collaborative Frames**		
	Net Cost of Collaboration	Collaborative Investment	Investment Impact	Share of Collaborative Outcomes
1	4.86 (3.25) n=21	6.52 (3.47) n=27	6.75 (3.57) n=24	6.83 (3.74) n=24
2	4.05 (2.87) n=21	7.52 (3.37) n=27	6.67 (3.63) n=24	6.83 (3.74) n=24
3	3.71 (2.94) n=21	8.19 (3.31) n=27	7.04 (3.69) n=24	5.54 (3.92) n=24
4	3.81 (2.99) n=21	8.52 (3.07) n=27	6.29 (4.01) n=24	5.29 (3.77) n=24

[3] Because participants know the game terminates from Round 7 with a 25 percent chance, my analyses focus on the first six rounds.

5	4.00 (2.67) n=21	8.22 (3.42) n=27	6.54 (4.20) n=24	6.58 (3.75) n=24
6	3.19 (2.86) n=21	8.00 (3.45) n=27	6.21 (4.32) n=24	7.17 (3.69) n=24

Panel B: Planned Contrast

Round	***Source***	***Sums of Squares***	***df***	***Mean Square***	***F-Stat***	***p-Value***
1	-3, +1, +1, +1	55.72	1	55.72	4.51	0.036
2	-3, +1, +1, +1	143.51	1	143.51	12.18	0.001
3	-3, +1, +1, +1	168.79	1	168.79	13.82	0.000
4	-3, +1, +1, +1	137.04	1	137.04	11.26	0.001
5	-3, +1, +1, +1	159.16	1	159.16	12.45	0.001
6	-3, +1, +1, +1	253.81	1	253.81	19.19	0.000

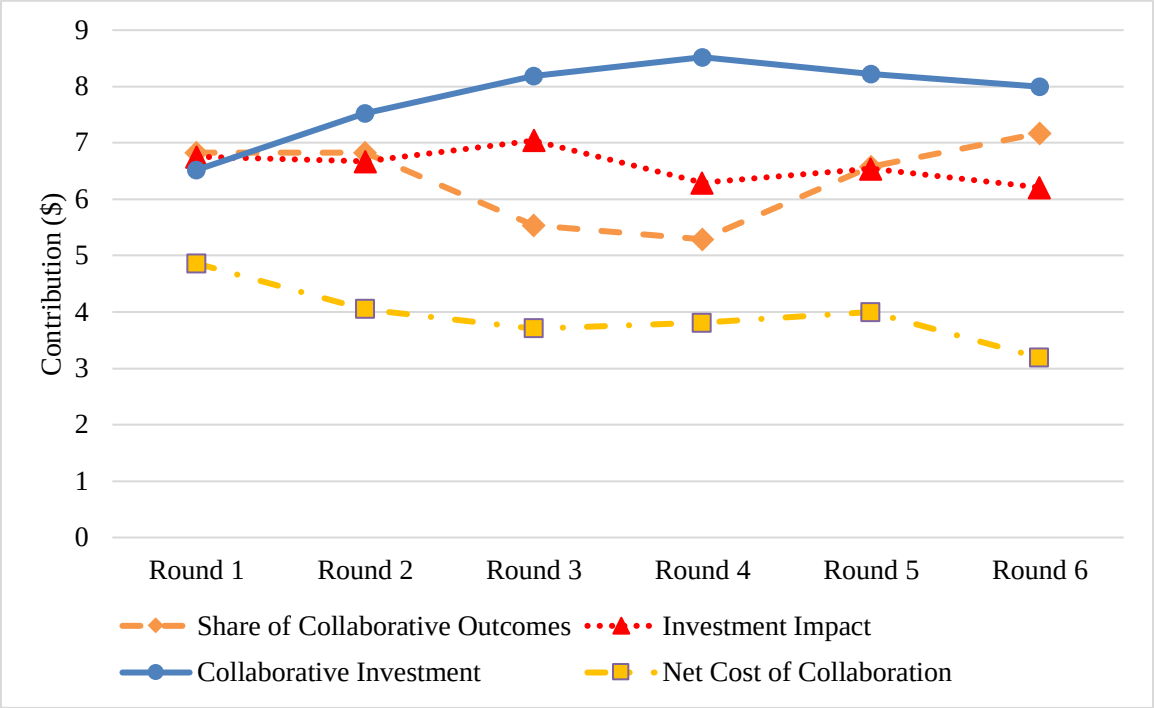
This table presents the descriptive statistics and results of hypothesis tests of participants' contributions amounts in the supplemental experiment. In this supplemental experiment, participants are asked to contribute money to a group account in a repeated public goods game. The number of rounds are at least 7 but no more than 10, with each possible number (i.e., 7, 8, 9, or 10) being equally likely. Depending on their condition, participants are asked to report their contributions behavior to group members in one of the subsequent frames: the net cost of collaboration, the collaborative investment, the investment impact, or the share of collaborative outcomes. The primary dependent variable is participants' contribution amounts. And to avoid the confounding ending effects, my analyses focus on the first 6 rounds.

Panel A presents the descriptive statistics for participants' contribution amounts in the first 6 rounds.

Panel B presents the planned contrast test whether the participants' contribution amounts in the collaborative investment frame condition, the investment impact frame condition, and the share of collaborative outcomes frame condition are higher than those in the net cost of collaboration frame condition. I perform this comparison by using contrast coefficients of -3 for the net cost of collaboration frame condition, +1 for the collaborative investment frame condition, +1 for the investment impact frame condition, and +1 for the share of collaborative outcomes frame condition.

All *p*-Value are two-tailed.

Figure 3: Contribution Amounts in the Supplemental Experiment



In the initial round, I successfully replicate the results from the primary experiment (Panel A of Table 3). Planned contrast results suggest that contribution amounts in the three collaborative frame conditions are significantly higher than those in the individualistic frame condition (Panel B of Table 3). Untabulated planned comparison results further reveal that each of the three collaborative frames stimulate significantly higher contribution amounts to the group account than the individualistic frame (all $p<0.05$, one-tailed). Overall, these results replicate the effects of reporting frames I find in the primary experiment.

Second, as depicted in Figure 3, the graph shows that individuals tend to behave consistently in all rounds under each reporting frame. Specifically, individuals are more

willing to contribute more under the three collaborative frames than under the individualistic frame in the subsequent five rounds after the first round (Table 3). Therefore, I conclude that the effects of reporting frames are still strong in a multi-period setting, supporting the idea that certain reporting frames do help to encourage collaboration even in a setting with reputation.

CHAPTER 7. CONCLUSIONS

In this study, I experimentally investigate a new measure that encourages collaborative effort and curtails free riding issues. Particularly, I argue that *ex post* reporting frames could lead to different levels of *ex ante* collaboration in a public goods game. Based on the framing effects from psychology literature (Levin et al., 1998), I argue that individuals' contributions depend on the concentration of reporting frames they use to report their behavior to group members. Under the collaborative investment frame, the investment impact frame, or the share of collaborative outcomes frame, individuals are reminded of the personal or group benefits of contribution decisions, concentrate on positive aspects of contributing, and in turn contribute high amounts to the group account. Conversely, the net cost of collaboration frame reminds individuals of their cost from contributing. Hence, individuals focus more on reasons not to contribute and in turn contribute low amounts to the group account.

My findings support my hypothesis in the following ways. First, a planned contrast reveals that the three collaborative reporting frames lead to higher contribution amounts than the individualistic frame. Second, to provide further insights into the effect of reporting frames on collaboration, I demonstrate that the collaborative reporting frames reduce free riding issues by decreasing the number of individuals who tend to contribute less than $5 to the public goods. Third, my theory predicts that this relationship is mediated by individuals' reasoning focus in thinking through decisions. A mediation analysis supports this assertion. Finally, to find the key factor in individuals' reasoning focus, I

conduct supplemental analyses and find that the collaborative reporting frames change individuals' perspectives on trust, and in turn change individuals' willingness to contribute.

My study suggests several avenues for future research. First, to clearly attribute the contributions differences to the frames of reports, participants are forced to faithfully report their decisions but are not allowed to lie. This limits my ability to generalize my results to settings where individuals could lie in reporting procedures. Future research could investigate how lying affects contributions behavior. Since auditors could audit the reports, it would be interesting to investigate how auditing mechanisms work in settings where individuals could lie. Second, since my findings in the additional analyses reveal that trust mediates the relationship between reporting frames and contribution amount, further research could further examine the role of trust in public goods settings.

My study has several important implications. First, my study adds to the literature on real effects of disclosure. While prior research reveals different real effects of disclosure (Kanodia and Sapra, 2016), my study extends this stream of literature and suggests a new beneficial consequence of disclosure—enhanced collaboration. Second, although previous literature explores how feedback information overcome free riding issues in collaborative settings (Böhm and Theelen, 2016; Chaudhuri, 2011; Nikiforakis, 2010; Ledyard, 1995), my findings suggest an alternative tool to boost collaboration in a way that no authority is required to provide that feedback information. Third, Martin and Moser (2016) find that managers choose to report CSR information in favor of investors' preference. Since CSR activities are one type of collaboration, I provide a framework for regulators, preparers, and readers when categorizing CSR activities or outcomes in CSR reporting.

APPENDIX A. EXPERIMENTAL INSTRUMENT

Net Cost of Collaboration **condition:**

Today, each participant, including you, will get an endowment of $10. You and another two participants will randomly form a group of three, sharing a public account together. You and your group members will individually decide how much you want to contribute to the group account, indicating that you allocate the $10 endowment between your private account and your group account. Every dollar you contribute to the group account will be multiplied by 1.5, resulting in 1.5 dollars increase in the group account. You and the other two group members will share the total amount in your group account equally. In another word, you lose half dollar per dollar you contribute. After all group members make decisions and submit reports, you and the other two group members will see all three reports. In other words, how much you lose from your contribution will be reported to group members.

Your compensation = $5 + ($10 – your contribution) + 1/3* (1.5 * all group members' contributions)

Collaborative Investment **condition:**

Today, each participant, including you, will get an endowment of $10. You and another two participants will randomly form a group of three, sharing a public account together. You and your group members will individually decide how much you want to contribute to the group account, indicating that you allocate the $10 endowment between your private account and your group account. Every dollar you contribute to the group account will be multiplied by 1.5, resulting in 1.5 dollars increase in the group account.

You and the other two group members will share the total amount in your group account equally. After all group members make decisions and submit reports, you and the other two group members will see all three reports. In other words, how much you contribute will be reported to group members.

Your compensation = $5 + ($10 – your contribution) + 1/3* (1.5 * all group members' contributions)

Investment Impact **condition:**

Today, each participant, including you, will get an endowment of $10. You and another two participants will randomly form a group of three, sharing a public account together. You and your group members will individually decide how much you want to contribute to the group account, indicating that you allocate the $10 endowment between your private account and your group account. Every dollar you contribute to the group account will be multiplied by 1.5. In other words, you will increase the group account by 1.5 dollars per dollar you contribute. You and the other two group members will share the total amount in your group account equally. After all group members make decisions and submit reports, you and the other two group members will see all three reports. In other words, how much you increase the group account will be reported to group members.

Your compensation = $5 + ($10 – your contribution) + 1/3* (1.5 * all group members' contributions)

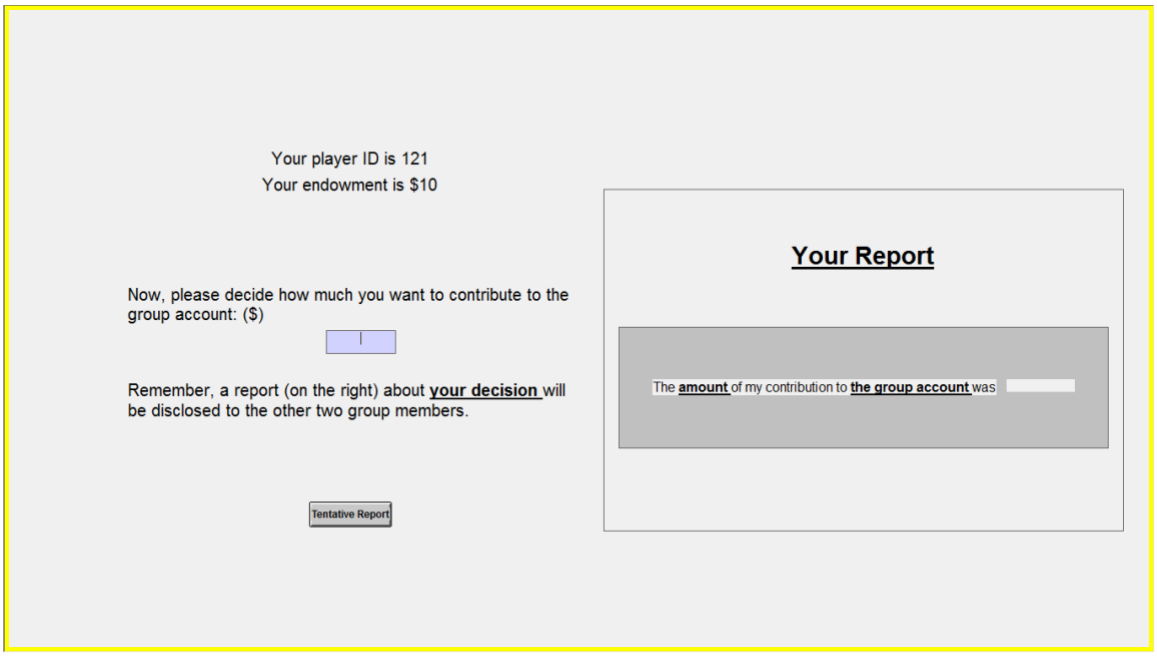
Share of Collaborative Outcomes **condition:**

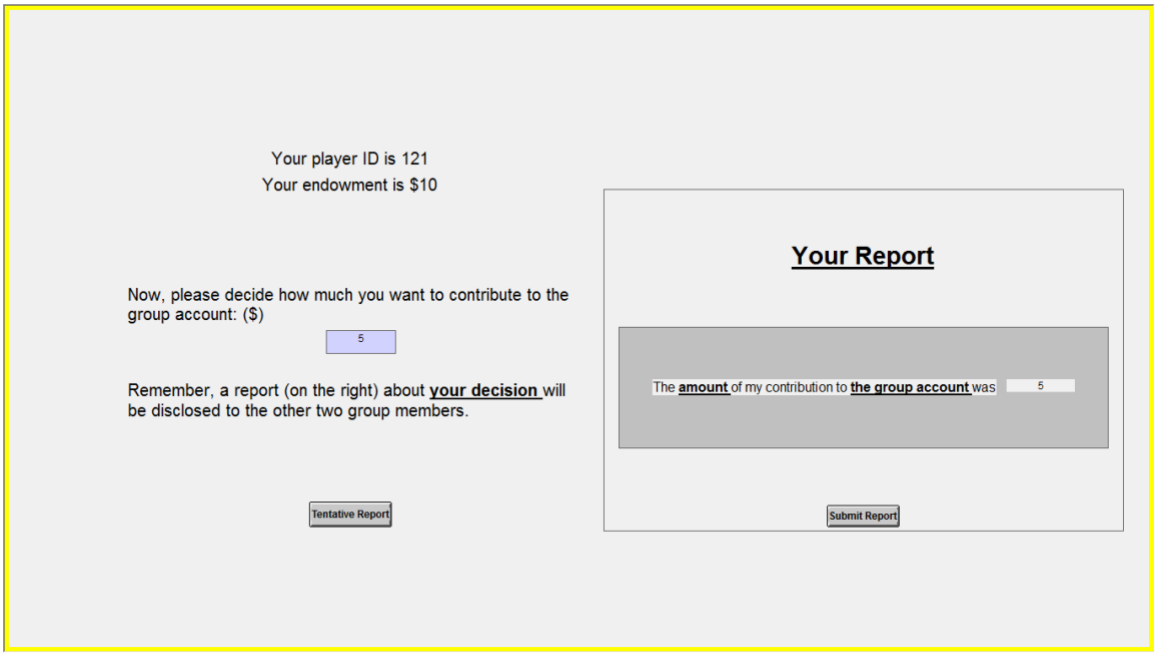
Today, each participant, including you, will get an endowment of $10. You and another two participants will randomly form a group of three, sharing a public account

together. You and your group members will individually decide how much you want to contribute to the group account, indicating that you allocate the $10 endowment between your private account and your group account. Every dollar you contribute to the group account will be multiplied by 1.5, resulting in 1.5 dollars increase in the group account. You and the other two group members will share the total amount in your group account equally. After all group members make decisions and submit reports, you and the other two group members will see all three reports. In other words, how much you get back from your contribution will be reported to group members.

Your compensation = $5 + ($10 – your contribution) + 1/3* (1.5 * all group members' contributions)

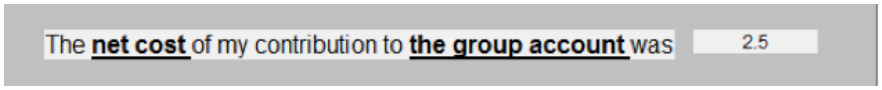
APPENDIX B. DECISION SCREENS



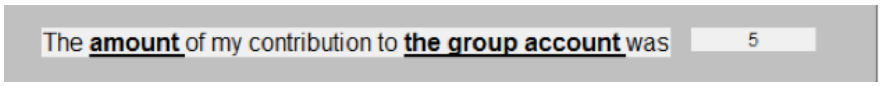


APPENDIX C. MANIPULATION

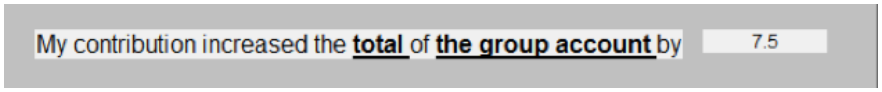
- **Individualistic Frame:**
  - Net cost of collaboration frame



- **Collaborative Frames:**
  - Collaborative investment frame



  - Investment impact frame



  - Share of collaborative outcomes frame

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